Project Fact Sheet

Optimization of a Solar Fired Double Effect Absorption Chiller

GOALS

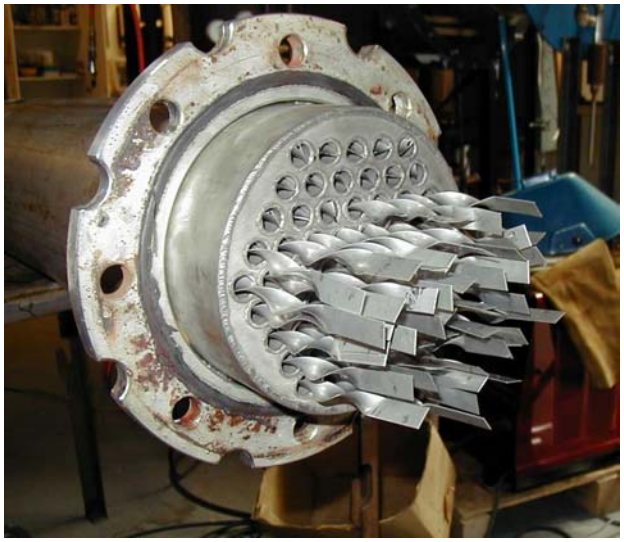
This project is concerned with improving the performance of solar-fired, double effect HVAC systems by optimizing the design of the high temperature generators in absorption chillers. Accomplishments include:

- The project showed that the average mean temperature difference can be reduced from between 40-50°F to 18°F by installing inserts in the tubes.
- The chiller still operates with an actual COP of approximately 1.0 and provides all of the cooling required by an 8,000 ft^2 building. These are very significant results with regard to improving the performance of the chiller.
- The project went a long way toward achieving the ultimate objective of operating the first-stage generator at approximately 250°F.

PROJECT DESCRIPTION

The main objective of this project is to develop a method of lowering the requirement of 300°F heating water. The ultimate goal is to operate at about 250°F while maintaining the Coefficient of Performance (COP) and the cooling capacity of the absorption chiller.

The work completed involved optimizing the design of the high temperature solar generator. A method of augmenting the heat transfer process in the generator was developed, bench tested and implemented in an operating 20 ton solar HVAC system. The optimized design involved installing twisted stainless steel inserts in the tubes where the $LiBr/H_2O$ solution boils and the refrigerant vapor is generated. The inserts augment the overall heat transfer coefficient between the heat medium in the shell side of the generator and the working fluid in the tubes.

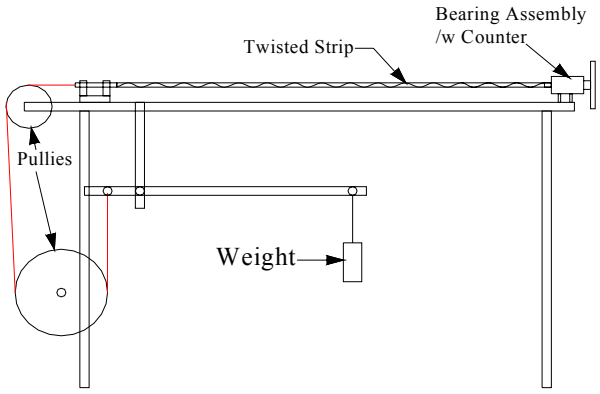


BENEFITS TO CALIFORNIA

The main advantage of solar HVAC systems is that they displace electrically driven compression air conditioners, which are the cause of the summertime peak demand problem experienced by many electric utilities in California. The potential benefits to California resulting from the widespread implementation and use of solar chiller technology are enormous. Compression air conditioners require about 1.5 kW per ton. The pumps and fans used to operate a solar HVAC system require about 0.2 kW per ton. As a result, the net demand reduction is 1.3 kW per ton or 26 kW for a 20 ton system. The installation of even 50 solar HVAC systems per year, with an average capacity of 20 tons, would result in an annual peak demand reduction of 1,300 kW or 1.3 MW. There are very few renewable energy technologies that have the potential to reduce peak electrical demand by this amount.

FUNDING AMOUNT

Commission	$150,000
Match	$13,750
Total	$168,750



PROJECT STATUS

Project is completed.

FOR MORE INFORMATION

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